Science Behind Sustainable Seafood: Responsible Management – You decide!

Brief Overview

This role playing activity will get students involved in the process that is used to make management decisions in federal waters off the U.S. Four teams will represent the various stakeholders in the Pollock fishery: scientists, will present their findings and recommendations for an Allowable Biological Catch; concerned citizens will recommend reasons why the ABC needs to be decreased; the fishing industry, will support the scientists findings with their own anecdotal evidence and council members who will listen to all the sides and make the final recommendation that will go to NMFS and the Secretary of Commerce for approval. This activity will provide students with experience in how decisions are made in the federal fishery management process.

The activity may take up to two 50 minute periods. First 50 minute period will be to go over the rules of the activity, team roles and team analyses of their data. Second 50 minute period will have students develop their case and then present to the fishery management council.

Big Ideas: Responsibly managed fisheries are achieved through good science and collaboration by many stakeholders.
Essential Question: What does it take to ensure sustainably harvested seafood?
Objectives: Technique analysis ---- Teach students how scientists collaborate to determine how many fish can be sustainably harvested from population.

Key Subjects/Standards

National	**Science**: NS.9-12.1 Science as Inquiry. NS 9-12.3 Life Science: Interdependence of organisms, Behavior of organisms. NS 9-12.6 Personal and Social Perspective: Population growth, Natural resources, environmental quality. **Math:** NM-NUM. 9-12.3 Number and Operations: compute fluently and make reasonable estimates. NM-PROB.CONN.PK -12.3 Connections: recognize and apply mathematics in contexts outside of mathematics. **Economics:** NSS-EC.9-12.1 Scarcity. NSS-EC.9-12.4 Role of incentives. **Social Sciences:** NSS-G.K-12.2 Places and Regions. NSS-G.K-12.3 Physical Systems.
Ocean Literacy	5. The ocean is filled with diversity. 6. The ocean and humans are inextricably interconnected (b, c, e, g).

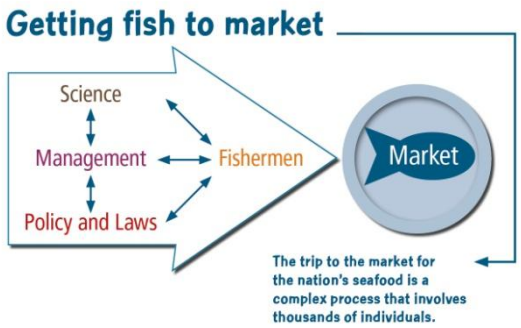
Teacher Preparation

1. Read the entire activity and review all background material and resources.
2. Determine the amount of time you would like to dedicate to this activity. If classroom time is readily available, a minimum of two 50-minute classroom periods plus some time for students to reflect during the previous 4-5 lessons is advised. If classroom time is limited, students may complete some of their tasks as homework.
3. Determine the best assessment strategy for your class based on suggestions made by authors.

Materials List

- Fact sheet and Data for scientist team (Pollock assessment from last 3 years, environmental information)
- Fact sheet for concerned citizens
- Fact sheet for Industry group
- Fact sheet and Rubric for Council team

Background



Instructional Strategies/Procedures

Exploration

1. Discuss the graphic above with the students. Why are the different components important in ensuring sustainable seafood?
2. Read Part 3 in the Journey from Sea to Market series. Discuss the importance of a Fishery Management Council.

Engagement

Step 1: Divide the class into 4 teams of three to five people. Scientists; Concerned Citizens; Industry; and Council.

Step 2: Each gets different reading, different data sets, samples, maps or problems, different issues for discussion, different field sites, and so on. See factsheets below.

1. Industry representatives – Respect the science give us the full scientist recommended TAC, don't reduce further.
2. Council members – Council members do not have a position. They must objectively review all the information presented to them and make decisions based on the National Standards of the Magnuson-Stevens Fishery Conservation and Management Act.

3. Concerned Citizens - You are a group of concerned citizens representing various non-profit/non-governmental organizations (NGO), you may also represent an Alaska Native group.
4. Scientists - We analyzed the data and came up with a TAC. It was decreased by 5% because of uncertainty in certain ecosystem parameters.

Step 3: Go over background of what a Council meeting entails. Why is it important to hear everyone's perspective?
Step 4: Each team receives a factsheet and possibly a dataset to work on solving their part of the mystery.
Step 5: Each team will have to come to consensus on their point of view. When finished with their deliberation, the teams will then develop their presentation.
Step 6: Don't assume that individual groups will head in the right direction without some guidance. You need to make sure that each team is prepared make the points that you want them to make. You or an assistant needs to check in with each team at least once during the discussion session to make sure that the team has not missed the boat. Be gentle and *listen* – nudge, don't pontificate. Resist the temptation to direct too strongly. As long as the team is on the right track and is prepared to address the main issue adequately, let them digress and explore. What strikes them as significant might open your eyes to something you have missed.
Step 7: Each home team will work on a presentation of their findings to present to the rest of the class. Be creative on how the students can present their findings. Poster presentation, oral presentation, dance or song can be something fun and educational. It is the responsibility of each team to make sure that all of its members understand the material thoroughly and are prepared to teach it. It helps to provide guidelines for what you mean by "teach".
Step 8: Some type of written assignment should result from the peer teaching effort, and students should have that assignment in mind as they work in their groups. A written assignment might involve comparing work done by a student's own team with that done by a different team. Alternatively, an assignment might ask a student to take all of the information presented by each team and use it to address a new/different/summary issue.
Step 9: If the size of the class permits, evaluate students in the group setting. Sit in on a group session, and evaluate each person's ability to teach the rest of the group. Fill out the evaluation form during the session so that students can have feedback immediately after class. This is a very useful tool for helping students improve, particularly if you outline clearly what your criteria are for assigning each level in your grading scale. Knowing that they could be evaluated at any time gives students a real incentive to come prepared, and a carefully done evaluation gives them suggestions on how to improve. It helps if you and several student assistants can simultaneously evaluate several groups in order to evaluate as many students as possible during a single session, but you can evaluate one group at each session by yourself. In a larger class, you simply won't evaluate any individual as often. If you can work out a way to evaluate everyone at every session early in the course, however, you will see faster progress in students' abilities to teach one another.
Step 10: Have each group present their point of view to the Council. This might be a comparison of information from each team or it might be an entirely new task that requires information from each of the teams to solve. *This is a crucial aspect of the jigsaw.* Without a culminating group task, the exercise is little more than four mini-presentations by individual students without incentive for students to teach or learn from each other.

Step 11: The Council will take all teams data and deliberate and come back with a decision. Bring everyone back together toward the end of the class, and ask each group for its most important point. Make a list of main points on the board, going around a second time to each group if people still have points to make. Use the time to elaborate (a little! don't turn it into a lecture!) or to emphasize important issues. You can be sure this way that you drive home the most important points. This also serves to confirm for the students that they have done a good job in recognizing the important points. If you have student assistants, ask them for additional points. This is a way to give your student assistants credibility and also to have a "plant" in the audience in case (and it *does* happen) one of the important points is not raised by one of the groups. As an aside, keep careful track of those points, because, for one reason or another, students have missed them and will need different reading or direction the next time in order to catch the point, if it is indeed as important as you had originally thought.

Extensions & Connections

- Have students read the Bering Sea/Aleutian Islands Fishery Management Plan.
- Find out how Pollock is rated by multiple eco-labels – determine why there are discrepancies. http://seafoodforthefuture.org/resources/comparison-chart/

Assessment

Presentations of information from each group should be done using a poster (analog) or with power point (digital)
Scientists - Presentation to Council.
Industry - Presentation to Council
Concerned Citizens - Presentation to council
Council – writes up recommendation– Scorecard on National standards for each group. Depending on number of checks in national standard scorecards, decrease TAC by a certain percentage. See Council factsheet below.

Vocabulary: Stock Assessment: Collecting, analyzing, and reporting demographic information for the purpose of determining the effects of fishing on fish populations.

Possible Misconceptions

There are no regulations for fisheries.

Project Evaluation

At the end of the project the teacher should fill out the SBSS evaluation form.

Resources for Teachers

Training for new Council members - various presentations
http://www.nmfs.noaa.gov/sfa/reg_svcs/Councils/Training2011/Agenda.htm

Role: Concerned Citizen

Position: Respect uncertainty in the science, reduce the TAC by x percent.

Who are you?

You are a group of concerned citizens representing various non-profit/non-governmental organizations (NGO), you may also represent an Alaska Native group.

Why are you concerned?

1. Fishing may harm bottom habitat
2. Fish populations may decrease due to climate change
3. Marine Mammal populations are decreasing and need more pollock to eat.
4. Alaska Native subsistence foods may be negatively impacted by fishing effort.

For your presentation:

- Introduce your group – come up with a name and what your mission is.
- Statement of your concern – choose one from above list.
- Present information that supports your concern.
- Conclude with how much your group proposes to lower the TAC (in percent).

Roles for group

- Presenter(s) – one or two can present
- Researcher(s)
- Analysis -all

Resources

Role: Fishery Scientists

Position: We analyzed the data and came up with a TAC. It was decreased by 5% because of uncertainty in certain ecosystem parameters.

Who are you? and What do your data say?

1. Fish biologist – what is age distribution of population from fishery data and from survey data
2. Fish oceanographer – where are baby Pollock and what are the oceanographic conditions? what is the bottom temperature for 2011? What happens to Pollock population when the water is cold?
3. Observer – How much fish did fishery catch? What does the trend look like? Bycatch data?
4. Ecologist – What other ecosystem parameters should be considered?

For your presentation:

- Introduce your group – What are your jobs?
- Statement of your findings
- Present information that supports your findings.
    - Population estimation
    - Calculation of overfishing level (OFL) and total allowable catch (TAC)
    - What are key environmental indicators saying?
    - Fishery catch data compared to total population size.
- Conclude with your proposed TAC level and why it may be less than what was calculated.

Roles for group:

Each group member is one type of scientist. If you do not have enough people just omit one of the scientists, but you still have to present their data. Take turns presenting your findings to the Council, so everyone gets a chance to present.

Resources:

2012 BSAI Pollock Assessment

2012 Ecosystem Considerations Chapter

Role: Industry stakeholders

Position: Respect the science give us the full scientist recommended TAC, don't reduce further.

Who are you?

1. Large Fishing Company: Trident Seafood Company, American Seafood,
2. Small Boat Fisherman,
3. Restaurant owners or Chef
4. Shipbuilder, Bank loan officer, or hotel owner.

Research the history in how industry supports sustainable seafood

Presentation:

- Introduce your position
- Present history of industry in seafood industry
- Present economic data from Alaska seafood
- Conclude that industry supports science and that the TAC should not be reduced any further.

Role for Groups:

- Researcher(s)
- Compiler of information
- Create presentation
- Presenter(s)

Resources:

- Chef's Collaborative - http://chefscollaborative.org/
- Alaska Seafood Marketing Institute - http://www.alaskaseafood.org/
- Fisheries of the U.S.- economic data on U.S. fisheries - http://www.st.nmfs.noaa.gov/st1/fus/fus10/FUS_2010.pdf
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Role: Fishery Management Council

Positon: Council members do not have a position. They must objectively review all the information presented to them and make decisions based on the National Standards of the Magnuson-Stevens Fishery Conservation and Management Act.

Who are you?

Council members
The ideal Council appointee candidate is knowledgeable in fishery conservation management and the commercial or recreational harvest of fishery resources through occupational experience, scientific expertise, or related training. http://www.fakr.noaa.gov/npfmc/membership/council-members.html

Duties:
All Council members must take the training by going over the Intro to Council powerpoint presentation.
Robert's Rules of order – see handout

Council Scorecard

Using the National Standards scorecard below, provide a check for each national standard that each group satisfies through their presentation.

National Standards		Scientists	Citizens	Industry
1	Achieve Optimum Yield and prevent overfishing			
2	Best available scientific information			
3	Manage stocks as a unit			
4	Allocations fair and equitable, promote conservation, and prevent excessive shares			
5	Consider efficiency in utilization; not have economic allocation as sole purpose			
6	Allow for variations and contingencies			
7	Minimize costs, avoid duplication			
8	Consider fishing communities to provide for their sustained participation and to minimize adverse economic impacts			
9	Minimize bycatch, bycatch mortality			
10	Promote safety of human life at sea			
	Total number of checks			

Based on the number of checks, lower the TAC using the table below: # of checks >1, lower by 2%; # checks >5, lower by 5%; #of checks >7, lower by 10%.

Presenter	TAC	Decrease TAC (%)	Total
Scientists		NA	
Concerned Citizens			
Industry Stakeholders			